

What is claimed:

- 5 1. A vertical cavity surface emitting laser (VCSEL) comprising:
an active region;
a contact region in at least one side of the active region providing current to be distributed through the active region; and
10 a stabilizer module for stabilizing the gains among a plurality of modes induced by spatial power instability by increasing the current through the contact region.
2. The VCSEL as recited in claim 1 wherein the VCSEL is an oxide VCSEL.
3. The VCSEL as recited in claim 1 wherein the VCSEL is used in high-speed communication links over a multimode fiber.
- 20 4. A vertical cavity surface emitting laser (VCSEL) used in a multi-channel system, the VCSEL comprising:
an active region;
a contact region in at least one side of the active region providing current to be distributed through the active region; and
25 a stabilizer module for stabilizing the gains among a plurality of modes induced by spatial power instability by increasing the current through the contact region.
- 30 5. The VCSEL as recited in claim 4 wherein the VCSEL is an oxide VCSEL.
- 35 6. The VCSEL as recited in claim 4 wherein the VCSEL is used in high-speed communication links over a multimode fiber.

Sub A2/

7. A method for stabilizing modes in VCSEL, said method comprising:
determining whether the modes in the VCSEL are unstable based on changes
in operating characteristics of the VCSEL; and

5 adjusting bias current of the VCSEL to stabilize the modes to compensate for
the changes in the operating characteristics.

8. The method as recited in claim 7 wherein the VCSEL is an oxide VCSEL.

10 9. The method as recited in claim 7 wherein the step of adjusting bias current further
comprises adjusting bias current up to a saturation level of the VCSEL.

Sub A3/

10. The method as recited in claim 11 wherein the VCSEL is used in high-speed
communication links over a multimode fiber.

11. A system for stabilizing modes in a VCSEL, said system comprises:
a first module for determining whether the modes in the VCSEL are unstable
based on changes of the operating characteristics; and
a second module for adjusting bias current of the VCSEL to stabilize the
modes to compensate for the changes in the operating characteristics.

12. The system as recited in claim 11 wherein the VCSEL is an oxide VCSEL.

25 13. The system as recited in claim 11 wherein the step of adjusting bias current further
comprises adjusting bias current up to the saturation level of the VCSEL.

Sub A4/

14. The system as recited in claim 11 wherein the VCSEL is used in applications of 1.2
30 Gb/s and 2.5 Gb/s frequencies

15. The system as recited in claim 11 wherein the VCSEL is used in high-speed
communication links over a multimode fiber.

16. A stabilizer module for stabilizing a VCSEL, the stabilizer module comprising:
a power module for measuring spatial and spectral power of the VCSEL;
a determination module for determining whether the spatial and spectral
power of the VCSEL is unstable because of modal gains; and
a current module for increasing bias current to a level where the VCSEL is
stable if it is determined that the VCSEL is not stable.

17. The stabilizer module as recited in claim 16 wherein the VCSEL is an oxide VCSEL.

18. The stabilizer module as recited in claim 16 wherein the current module adjusts bias
current up to the saturation level of the VCSEL.

19. The stabilizer module as recited in claim 16 wherein the VCSEL is used in
applications of 1.2 Gb/s and 2.5 Gb/s frequencies

20. The stabilizer module as recited in claim 16 wherein the VCSEL is used in high-speed
communication links over a multimode fiber.